Perception of Facial Expressions: Effect of Facial Angle on Emotion Category Effect

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PERCEPTION OF FACIAL EXPRESSIONS: EFFECT OF FACIAL ANGLE ON EMOTION CATEGORY EFFECT

By

HANAYA MICHIKO (花屋道子)[1]

(Tohoku University)

Six target persons' two facial expressions (happiness, sadness) observed from three angles (front view, right side 3/4 view, left side 3/4 view) are tachistscopically presented in this experiment. Twenty students are asked to fast and accurately press one of the two keys according to the stimulus's facial expression. The result shows that while the difference in reaction time in observing both the happy face and the sad face stimulus is insignificant when the stimuli are viewed from the 3/4 angle, the reaction time for the happy face is significantly shorter than the reaction time for the sad face when the stimuli are observed from the front.

Key words: facial expression, emotion category effect, 3/4 view

INTRODUCTION

For the sake of knowing how a person feels, we can use plenty of cues. Facial expression is thought to be one of the most important signals that shows the person's emotional state. It has been reported that people can perceive several basic expressions (i.e. happiness, surprise, fear, disgust, anger, sadness) quite accurately, even if they are from different countries (Ekman, 1982; Kirouac & Doré, 1983). One study which used infants as subjects shows that even infants can accurately tell the basic expressions of other children, and the accuracy increases as the subjects grow up (Reichenbach & Masters, 1983). In daily life, the expression of emotions does not linger. In their experiment, Kirouac and Doré (1984) made their subjects discriminate the target person's facial expressions under several exposure time conditions. They reported that even under the very short exposure time conditions, for example, 30msec, their subjects could discriminate the facial expressions quite accurately.

Furthermore, in many of the studies that dealt with the accuracy of human perception of facial expressions, the emotion category effect was observed. That is, the happy face expression could be judged more accurately than other facial expressions. This phenomenon occurred not only with adults (Kirouac & Doré, 1983, 1984) but also with children (Reichenbach & Masters, 1983). At first, researchers did not pay much attention to this phenomenon, but recently this phenomenon is gradually being considered as an important cue through which the mechanism of facial expression processing could be better understood.

There are several studies of which this phenomenon is the main concern (e.g., Feyereisen, Malet & Martin, 1986; Kirita, Endo & Maruyama, 1992). In their investigations, they discovered that this phenomenon could be observed not only in the accuracy studies, but also

1. Department of Psychology, Faculty of Arts and Letters, Tohoku University, Kawauchi Aobaku, Sendai 980, Japan.

in the experiments using the technique of reaction time. In other words, reaction time for the judgment of the happy face was significantly shorter than that of the sad face. With these findings, we can conclude that the emotion category effect is a stable phenomenon which does not disappear even when a different experimental procedure is used.

In this experiment, in order to determine if this phenomenon truly depends on the visual trait of the stimulus, facial photographs of the front view, the left 3/4 view, and the right 3/4 view will be used as stimuli. In many studies which dealt with the recognition of unfamiliar faces, the 3/4 view advantage was observed. In other words, the task performance was better for the 3/4 view condition than for the front view condition (Krouse, 1981; Logie, Baddeley, & Woodhead, 1987). In regard to the same finding, Bruce, Valentine, and Baddeley (1987) assumed that the 3/4 view image could include more cues available to identify the person than the front view image. In the following experiment, the perception of facial expressions of the 3/4 view image will be compared with that of the front view image, by using a discrimination task.

Method

Subjects: Twenty undergraduate students of Tohoku University (ten male, ten female) who has volunteered for this experiment. They all have normal or correct-to-normal vision.

Stimuli: Six target persons (all female) were asked to express the facial traits of happiness and sadness. The photographs of their facial expressions were taken from three angles (i.e. front, right side 3/4 view, and left side 3/4 view) at the same time. The black and white slides of these photographs are used as stimuli.

Apparatus and procedure: The apparatus being used in this experiment is a slide projector (Kodak Ektagraphic, Model AF-2) controlled by a personal computer (Epson PC-286V). The stimuli are projected from behind a screen. The size of the stimulus, in visual angle, is about 6.7 degrees in height and about 5.0 degrees in width. The subjects are asked to judge whether the expression of the stimulus is happy or sad, and press one of the two keys according to the stimulus's expression as fast and accurately as possible. Each experimental session consists of 24 practices and 72 trials.

Results

Responses to the happy face and the sad face in each view angle condition are analyzed. Figure 1 shows the mean reaction time and Fig.2 shows the average percentage of error as a function of angle.

The result of a two-way analysis of variance performed on the reaction time data shows that the main effect of neither the expression nor the angle is significant. However the interaction between these two factors is significant ($F=4.85$, $df=2/38$, $p<.05$). In other words, the reaction time for the happy face is significantly shorter than that for the sad face in the front view condition ($F=4.51$, $df=1/19$, $p<.05$). Additionally, this tendency is marginally significant in the right side 3/4 view condition ($F=3.63$, $df=1/19$, $p<.10$). The effect of angle is significant only for the happy expression, and the reaction time for the front

view image is shorter than that for the left side 3/4 view image ($F=4.87$, $df=2/38$, $p<.05$).

The analysis of the error rate reveals that there is no difference among the conditions, and that there is no speed-accuracy trade-off.

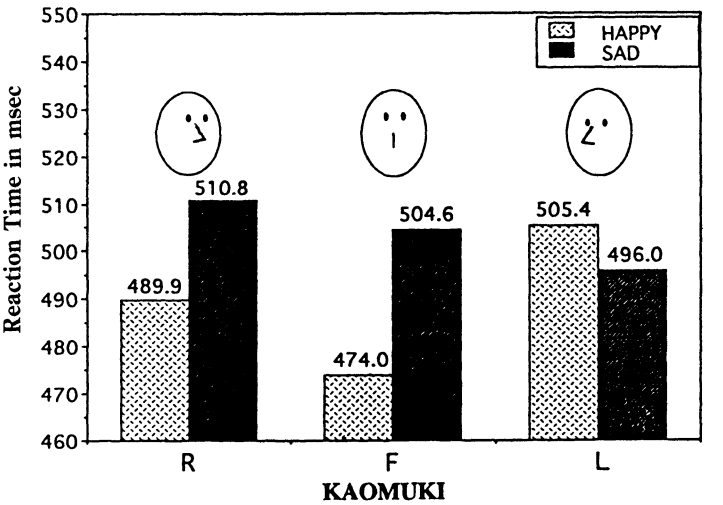

Fig. 1. Mean reaction time for the happy face and for the sad face, as a function of angle of the face.

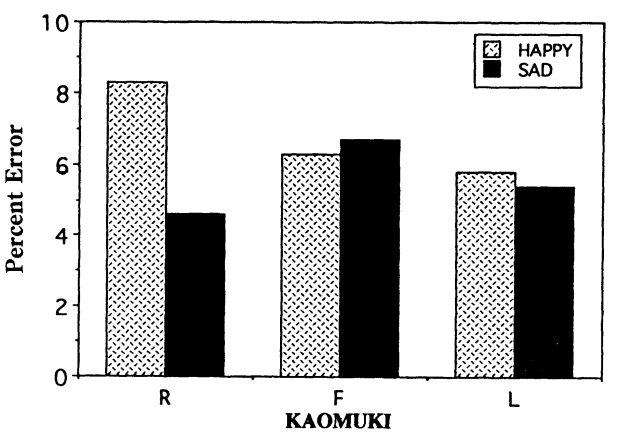

Fig. 2. Average percentage of error in the happy expression condition and in the sad expression condition, sa a function of angle of the face.

Discussion

A faster reaction to the happy expression is clearly observed only in the front view condition, and not in the 3/4 view condition. This indicates that the emotion category effect, at least partly, depends on the visual trait of the stimulus.

Figuve 1 shows that there is a difference in the results between the right side 3/4 view condition and the left one. Some researchers who dealt with the asymmetry in display of facial expression reported that the target person's left side of the face was more expressive than the right side (e.g., Sackeim, Gur & Saucy, 1978; Campbell, 1986). Considering this finding, it can be assumed that the emotion category effect will appear more clearly in left side 3/4 view condition than in right side 3/4 view condition. However the result of this experiment is not consistent with this assumption.

The 3/4 view advantage was observed in the studies of the recognition of unfamiliar face conducted by Krouse and his contemporaries, but the result of this current experiment shows no 3/4 view advantage. Moreover the inverse is observed in the happy face condition. This suggests that the information used in facial expression processing is different from the information used in individual identification processing. This is consistent with the idea that these two processes are independent of each other.

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